DOCUMENT RESUME

ED 221 214 IR 010 389

TITLE	Document Delivery--Background Papers Commissioned by the Network Advisory Committee. Network Planning Paper Number 7.
INSTITUTION	Library of Congress, Washington, D.C. Network Development Office.
REPORT NO	ISBN-0-8444-0403-9
PUB DATE	82
NOTE	84p.; Papers delivered before the Library of Congress Network Advisory Committee (Washington, DC, March 1982).
AVAILABLE FROM	Customer Services Section, Cataloging Distribution Service, Library of Congress, Washington, DC 20541 ($5.00).
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	Communications; Costs; Information Networks; *Information Services; *Interlibrary Loans; Library Automation; Library Cooperation; *Library Planning; *Library Services; Technological Advancement
IDENTIFIERS	*Document Delivery Services; Electronic Publishing; Library Statistics

ABSTRACT

Three papers set the framework for a 1982 program session on document delivery organized by the Library of Congress Network Advisory Committee. Following a list of committee members, the first paper, by James L. Wood describes: (1) dimensions of document delivery activity in the United States including statistics on borrowing and lending organizations, document delivery transactions, fill rates, turnaround times, types of documents requested, and costs; (2) component parts of the current document delivery process, incorporating awareness of document existence; identification of sources for borrowing; request verification, generation, transmittal, and processing; loan or copy transmittal; fee payment; and return of originals; and (3) changes expected in the document delivery process up to 1986. A glossary and explanation of acronyms are provided. The second paper, by M. E. L. Jacob, briefly reviews the technologies affecting document delivery in terms of input, storage, communication, and output. A bibliography is supplied. The third paper, by Susan H. Crooks, sets the stage for the future of libraries in the year 2000 by creating five scenarios encompassing a printed text service without books, a national reference service provided by a public corporation, a community culture center, a college/university information service, and an institute of research libraries. The impact of technology and market developments on library services is also discussed. (ESR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED221214

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☞ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ISSN 0160-9742

NETWORK PLANNING PAPER

NETWORK DEVELOPMENT OFFICE

NUMBER 7

DATE 1982

TITLE Document Delivery--Background Papers Commissioned by the Network Advisory Committee

Library of Congress

Washington

IR010389

Library of Congress Cataloging in Publication Data

Main entry under title:

Document delivery.

(Network planning paper / Network Development Office ; no. 7)
Bibliography: p.
Contents: Document delivery / by James L. Wood -- Document delivery technology / by M.E.L. Jacob -- Libraries in the year 2000 / by Susan H. Crooks.
Supt. of Docs. no.: LC 30.24:7
1. Document delivery--Addresses, essays, lectures. I. Wood, James L., 1926- . II. Jacob, M. E. L. III. Crooks, Susan. IV. Network Advisory Committee. V. Series.
Z674.4.D6 1982 025.6'2 82-600221
ISBN 0-8444-0403-9

Available from the Customer Services Section, Cataloging Distribution Service, Library of Congress, Washington, D.C. 20541

CONTENTS

	Page
Foreword	1
Document Delivery: The Current Status and the Near-Term Future, by James L. Wood	1-33
Document Delivery Technology: A Brief State of the Art Review, by M. E. L. Jacob	2-11
Libraries in the Year 2000, by Susan H. Crooks	1-28

FOREWORD

For its program session on document delivery held on March 9-11, 1982, the Library of Congress Network Advisory Committee commissioned three papers to set the framework for the discussions during the meeting. These papers are reproduced here because the advisory committee felt that they were of sufficient interest to the library and information communities to warrant distribution beyond the committee's normal constituencies.

The first paper by James L. Wood, "Document Delivery: The Current Status and the Near-Term Future," describes the dimensions of the document delivery activity in the United States, the component parts of the overall document delivery process in terms of their current status and trends, and the trends in the near-term future (one to five years). In the second paper, "Document Delivery Technology: A Brief State of the Art Review," Mary Ellen Jacob discusses the technologies affecting document delivery in terms of input, storage, communication, and output. Finally, Susan H. Crooks in "Libraries in the Year 2000" sets the stage for what the future holds for libraries by creating several scenarios.

The meeting for which these papers were commissioned was the outgrowth of discussions that took place at an earlier program session on September 15-17, 1981, on the broader topic of resource sharing. The meeting in March 1982 also featured a briefing on ADONIS, an electronic publishing system that is being developed by six journal publishers. Following this presentation, the attendees (using the technique of small group discussions) were given the task of identifying the substantive or critically important issues concerning document delivery that should be addressed within a timeframe of five years and the activities required to solve these problems.

Several themes, described briefly below, emerged from these small group discussions:

- To determine where we are and how to evaluate where we want to go, the following items are needed: (1) a model and/or assessment technique should be developed; (2) more current data on document delivery should be collected; (3) an inventory of appropriate technologies and services should be compiled; and (4) an assessment of the different technological options should be performed.

- Standards, in their broadest sense, are needed in areas related to linking computer systems, particularly at local levels, performance norms for document delivery services, common access methods to approach different data bases, and standardized bibliographic citations.

- The problems of public policy vs. for-profit services in the area of document delivery need to be addressed.

At its meeting on June 21-23, 1982, the advisory committee will be reviewing an action plan to act on these results. This plan includes as one of

its principal components a proposal to collect more current data on document delivery, a step that was recommended by Mr. Wood in his paper.

The efforts of the advisory committee's program planning subcommittee (Ward Shaw, chair; Henriette Avram, Toni Carbo Bearman, Mary Ellen Jacob, and Ronald Miller) in organizing these sessions are greatly appreciated. The support of the Council on Library Resources is also gratefully acknowledged. And lastly, the member organizations of the Network Advisory Committee are to be commended for their participation and support of these activities.

Henriette D. Avram, Chair
Network Advisory Committee

June 4, 1982

NETWORK ADVISORY COMMITTEE

Member Organizations

American Library Association

Member: Joseph Shubert (New York State Library)
Alternate: Carol Henderson (ALA Washington Office)

American Society for Information Science

Member: Ward Shaw (Colorado Alliance for Research Libraries)

AMIGOS Bibliographic Council

Member: James Kennedy
Alternate: Paul Vassallo (University of New Mexico Library)

Association of American Publishers

Member: Sandra Paul (SKP Associates)
Alternate: Thomas McKee

Association of Research Libraries

Member: William Studer (Ohio State University Libraries)
Alternate: Susan Martin (Johns Hopkins University Library)

Bibliographical Center for Research

Member: JoAn Segal

California Library Authority for Systems and Services

Member: Ronald Miller

Chief Officers of State Library Agencies

Member: Anthony Miele (Alabama Public Library Service)
Alternate: Anne Marie Falsone (Office of Library Services, Colorado Dept. of Education)

Federal Library Committee

Member: James Riley

Information Industry Association

Member: Robert Willard

Library of Congress

Chairman: Henriette Avram
Alphonse Trezza

Medical Library Association

Member: Erika Love (University of New Mexico Medical Center Library)

Midwest Region Library Network

Member: James Skipper

National Agricultural Library

Member: Wallace Olsen

National Commission on Libraries and Information Science

Member: Toni Carbo Bearman

National Federation of Abstracting and Indexing Services

Member: James Wood

National Library of Medicine

Member: Lois Ann Colaianni

NELINET, Inc.

Member:

OCLC, Inc.

Member: Mary Ellen Jacob
Alternate: Paul Schrank

Research Libraries Group

Member: John Heyeck

Southeastern Library Network

Member:

Special Libraries Association

Member: Irving Klempner (State University of New York, Albany)

University of Chicago

Member: Martin Runkle
Alternate: Charles Payne

Washington Library Network

Member: Roderick Swartz
Alternate: Ray DeBuse

Observers

American Association of Law Libraries

Betty Taylor (University of Florida Law Library)

Carnegie Corporation of New York

Richard Sullivan

Council on Library Resources

Warren J. Haas
C. Lee Jones

National Endowment for the Humanities

Margaret Child

-- WORKING PAPER --

DOCUMENT DELIVERY: THE CURRENT STATUS AND NEAR-TERM FUTURE

Prepared by:

James L. Wood, Director
Bibliographic Operations Division
Chemical Abstracts Service

for the

Library of Congress
Network Advisory Committee

January 29, 1982

PREFACE

The purpose of this working paper is to provide the Library of Congress Network Advisory Committee (NAC) background information on the current state of affairs regarding document delivery within the United States. The term document delivery is used rather than interlibrary loan because organizations other than libraries engage in providing documents (both originals and copies) to other organizations.

To facilitate communication among the NAC members who will be reading and discussing this paper, a brief glossary of relevant words and terms follows this preface. Explanations of the acronyms used in this working paper are to be found on pages 32 and 33.

It should also be noted that the information contained in this paper is exclusive of data on the numbers of documents provided by federally funded document copy providers such as the U.S. Patent and Trademark Office, the National Technical Information Service, the Educational Research Information Center, and the Defense Documentation Center.

Preparation of this paper has been hampered by the lack of published current information about document delivery in general and the lack of time and resources to collect current data. Recognizing these encumberances, published sources and private communications have been used to piece together data for this paper. The projections for the near-term future are based on experience and intuition.

GLOSSARY

Borrower - the individual or organization (usually a library) that requests a document.

Broker - an individual or organization that provides documents or document copies to borrowers but does not maintain stocks of the originals.

Copy - any reproduction on paper or film of an original document.

Document - the bibliographic entity being requested.

Document Delivery - the entire process from generation of the request through shipment of the document or a copy, including payment of fees and return of loaned documents to the lender.

Interlibrary Loan - see Document Delivery.

Lender - the organization (not always a library) that supplies the document or document copy to the borrower.

Loan - an original document provided by a lender to a borrower.

Original - the original work in contradistinction to any reproduction or copy.

INTRODUCTION

This paper is presented in three sections. Section I deals with the dimensions of the document delivery activity in the United States. Specifically, it is an attempt to quantify the number of libraries and other organizations involved with document delivery either as borrowers or lenders; to develop an estimate of the total document delivery traffic; and to provide information on fill rates, turnaround times, types of documents being requested, and costs.

Section II deals with the component parts of the overall document delivery function, beginning with the user's awareness of the existence of a document and ending with the user's receipt of the document or the lender's receipt of a loan. This section is intended to provide the status of current affairs and to show trends.

Section III reflects an attempt to look into the near-term future (one to five years). It consists primarily of some observations and speculations based on trends identified in Section II.

SECTION I: DIMENSIONS

Numbers of Borrowers and/or Lenders

The American Library Directory, 34th Edition--1981, lists 29,278 libraries in the United States, exclusive of elementary and secondary school libraries and small public libraries.(1) Each of these 29,278 libraries is a potential borrower or lender. Table 1 shows these 29,278 libraries by type.

Table 1

U.S. Libraries by Type

Type of Library	No.	Percent of Total
Public	14,831	50.7
Academic	4,796	16.4
Government	1,615	5.5
Special	8,036	27.4
TOTAL	29,278	100.0

The 1981 edition of Document Retrieval Sources and Services lists 171 organizations currently active as document or document copy providers.(2)

Numbers of Document Requests

For Library Photocopying in the United States[3] King collected data on photocopying during 1976 at public, academic, federal and special libraries. He estimated that 10.5 million copies were made for interlibrary loan transactions during that year. Table 2 shows King's findings by type of library.

Table 2

Number of Photocopies by Type of Library (1976)

(Millions of Photocopy Items)

Type of Library	No.	Percent of Total
Public	5.3	50.5
Academic	2.9	27.6
Government	0.7	6.7
Special	1.6	15.2
TOTAL	10.5	100.0

Source: King Research, Inc.,: National Library Survey

Data provided by the National Center for Educational Statistics (NCES) on aggregate interlibrary loans in the United States and information on federal libraries derived from the Federal Library Survey (1978) is given in Table 3.

Table 3

Interlibrary Loans: Aggregate United States

(Millions of Items)

Type of Library	Loaned	Borrowed
Public*	3.9	4.9
Academic**	3.0	1.9
Spec. Libs. Serving		
State Gov'ts.***	0.7	0.2
Federal Libraries****	0.7	0.59
Other Special	N/A	N/A

*8,456 libraries, 1978 (Source: NCES)

**2,644 libraries, 1978/79 (Source: NCES)

***1,134 libraries, 1976/77 (Source: NCES)

****1,052 libraries, 1978 (Source: Federal Library Committee)

During 1980/81, Association of Research Libraries' 111 members loaned 0.97 million originals and 1.5 million copies and borrowed 0.31 million originals and 0.28 million copies.(4)

Using King's data, i.e., 10.5 million photocopies made for interlibrary loan purposes, and ARL 1975/76 information on the ratio of copies to originals (Copies: 1.7 million loaned, 0.2 million borrowed; Originals: 0.97 million loaned, 0.2 million borrowed), it is possible to estimate the total

library-based document delivery traffic by type of library for 1976 as shown by Table 4.

Table 4

Estimated Total Number of Document Delivery Transactions in Libraries by Type of Library - 1976 (Millions of Transactions)

Type of Library	Originals*		Copies*		Total	
	No.	%	No.	%	No.	%
Public	3.6	50.3	5.3	50.3	8.9	50.3
Academic	2.0	27.5	2.9	27.6	4.9	27.6
Government	0.4	6.7	0.7	6.7	1.1	6.7
Special	1.1	15.2	1.6	15.2	2.7	15.2
TOTAL	7.1	100.0	10.5	100.0	17.6	100.0

*Based on ARL data, 59.5 percent of the requests were for copies and 40.5 percent for originals.

Assuming an estimated 17.6 million document delivery requests processed by libraries in 1976, it is probably safe to conclude that the total document delivery traffic for 1981 was no less and when one adds in the traffic handled by brokers, the total for 1981 is closer to 19-20 million.

Given that same 29,000 libraries and other organizations loaned or borrowed some 19-20 million documents during 1981, how well does the document delivery "system" in the United States perform? To answer this question, fill rates and turnaround times, types of documents being requested, and lender and borrower costs were reviewed to the degree such information was available.

Fill Rates

Do borrowers have a better chance today of having their requests successfully filled than several years ago? In 1968, Wood found the success rate for 68,634 requests received and sent by 3,363 organizations was 84.2 percent.(5) For 80,000 requests processed by the OCLC ILL Subsystem during a nine-week period, the fill rate was 97 percent.(6) During 1979/80, MINITEX had an 88.5 percent fill rate.(7) During 1981 the CAS Document Delivery Service filled 81.4 percent of the requests it received. For 1980/81, the University of Colorado (Boulder) Library filled 66.7 percent of the requests received and acquired 81 percent of the documents it requested from other libraries.(8) A 1978 study of 72 Idaho public libraries determined a fill rate of 75 percent(9) and a 19 campus study in California also conducted in 1978 found a 79 percent fill rate.(10) The 1981 fill rate for the Linda Hall Library was 80.7 percent.(11)

The answer to the question is a qualified yes. Chances are better now than a few years ago, but only if you use OCLC and direct the request to more than a single fill source. Otherwise, things are about the same. Even the British Library Lending Division (BLLD) fills only about 85 percent from stock.(12)

Turnaround Time

Turnaround time consists of the following components:

1. time the patron's request is with the borrowing institution,
2. time the request is in transit to lender,
3. time the request is in hands of lender,
4. time the copy or original is in transit to borrower.

In the California study, the average turnaround time was 5.1 days with 70 percent of the patrons' requests having been handled within three days, almost all by the end of the seventh day, and 95 percent of the requests transmitted to the lending institution via telefacsimile.(13) A study done at Knox College(14) determined that turnaround time could be reduced by 5.1 days (from 15.9 to 10.8) by placing orders using the OCLC ILL Subsystem. Dodson's study at the OCLC Library found the average elapsed time between placing the order and lenders shipping date to be 5.3 days and 11.6 days between placing the order and actual receipt of the requested document.(15) The CAS Document Delivery Service averaged 2.4 days to fill an order with 98.5 percent being shipped within 4.0 days. At MINITEX, 75 percent of the requests were filled within two days.(16)

Available information on turnaround time at specific libraries or library consortia is highly skewed by local practice to the degree that it is virtually impossible to draw meaningful conclusions applicable to document delivery as a

whole. Nevertheless, one conclusion can be drawn in regard to the current state of turnaround time. Electronic delivery reduces turnaround time ~ five days.

Some other observations can be made as the result of studying available literature. Turnaround time can be reduced if the borrower can reduce the amount of work the lender has to do, such as including the lender's call numbers on requests. Couriers and courier routes are generally faster than the mail. USPS Express mail and air express package services, e.g., Federal Express, reduce turnaround time for copy or original transmittal to the borrower to one day.

Costs

For each document delivery transaction, both the borrower and the lender incur expenses. One recent cost study places the cost of borrowing at $10.69 and the cost of lending at $6.23.(17) Another study showed the lending library's cost ($5.45) to fill a loan request was almost the same as its cost ($5.40) to process a request they could not fill.(18)

A review of 20 interlibrary loan cost studies conducted by Ferriero at MIT revealed that each calculated costs differently. However, if the borrower's cost is in the $10 range and the lender's cost in the $6 range, and if there are 20 million documents per year in the document delivery traffic, the aggregate annual expense for document delivery in the United States is an estimated $320 million.

As the number of libraries that charge to process incoming requests increases and as more libraries, especially special libraries, turn to for-fee document provision services such as ISI/OATS, CAS Document Delivery Service, and the hundred or so information brokers, the annual aggregate cost can only increase.

Document Types

Does document type (e.g., monographs, serials or some other) have any relation to document delivery system performance? As shown earlier, performance improvements during the past few years have come about as the result of online verification and ordering. Do the bibliographic utilities equally support the full range of requests? King's library photocopying study determined that 16.2 percent of the requests were for monographs, 56.2 percent for serials, and 27.6 percent for all other types.(19) Similar findings are given in Table 5.

Table 5

Document Delivery Requests by Type of Document by Percent of Totals

Source	Monographs	Serials	Other
Federal Lib. Survey(20)	?	80-90	?
CAS Doc. Del. Serv. (1981)	19	75	6
MINITEX (1978/79)(21)	?	80	?
Regional Med. Libs.(22)	?	85	?
Linda Hall Library(23)	?	97	?

When the distribution of document requests by document type is compared with the distribution by document type of bibliographic utility online records as shown by Table 6, it would seem that the utilities support primarily the monograph request traffic.

Table 6

Bibliographic Records in Utility Files
by Publication Type by Percent of Total

Utility	Monographs	Serials	Other
OCLC	85.8	6.2	8.3
RLIN	81.8	14.9	3.2
WLN*			

*No interlibrary loan component in WLN until late 1982.

With a very large percentage of the document delivery traffic concentrated in serials, borrowers may have to turn to other electronic message delivery systems for serials requests, such as those being developed by NLM (MEDLARS III),[24] CAS (CAS ONLINE)[25] or the recently announced availability of CULP (California Union List of Periodicals) online at BRS.[26]

SECTION II: DOCUMENT DELIVERY FUNCTIONS

The function of document delivery consists of several distinct components. While each borrowing or lending library or other organization has tailored its procedures and workflows to its own environment, there is enough commonality to make meaningful generalizations. In this Section of the report these components are described and notable changes from past procedures and practices are identified. The principal components are:

1. Gaining awareness of the existence of a document.
2. Identification of candidate fill sources.
3. Request verification and generation.
4. Request transmittal.
5. Request processing.
6. Loan or copy transmittal.
7. Payment of fees.
8. Return of originals.

Gaining Awareness

Library patrons and other end users employ both formal and informal methods to learn of the existence of documents. The formal methods include online searching of bibliographic data bases and manual searching of printed abstracts, indexes, and bibliographies. The informal channels of awareness are current reading and referrals from colleagues.

According to Cuadra Associates, there are now some 965 online data bases being offered by 170 different vendors.(27) The number of data bases available in 1981 increased by 25 percent over 1980. In minutes, searchers online can retrieve more references than they were able to retrieve in days or weeks of manual searching. With few exceptions, such as full text services (e.g., Lexis or Nexis), the unit retrieved is a citation which may or may not be accompanied by an abstract. Relevant hits result in document requests and those requests that cannot be filled from local stock frequently generate document delivery requests.

During 1980, NFAIS member services published 2,346,229 (printed and/or computer-readable) citations and estimate 2,428,880 for 1981.(28) One vendor or data base distributor, the Dialog Information Retrieval Service, added 20 million records to their online files during 1981.(29) The increasing use of online searching of commercially available bibliographic data bases is exemplified by the bibliographic utilities and library networks connect time purchase agreements with the data base distributors.(30)

Identification of Candidate Fill Sources

Once having learned of the existence of a document and established the need to go "outside" for a copy or loan, the next step is identifying a lender, i.e., fill source. The borrower has several options. There are the printed or COM tools, e.g., NUC and the RAL, NST, CASSI and local union lists. Also, there are the online locator tools, e.g., OCLC, RLIN, WLN, CASSI, CULP, and Serline. The borrower can also use the "blind try" method by just picking a library and placing the request.

Several studies have shown the effectiveness of using OCLC for identifying fill sources. In 1978, requests received by the Hunt Library at the Carnegie-Mellon University that had been verified using OCLC were filled 96 percent of the time while those verified in NUC or tried blindly met with only a 58 percent success rate.(31) MINITEX found that "improved bibliographic access allows users the option of going directly to holding libraries for needed materials."(32) The Florida Library Information Network compared using OCLC with TWX and closed-circuit teletype and found 75.6 percent of the requests sent via OCLC were filled versus 44.9 percent using TWX.(33) At Caltech use of OCLC permitted identification of more in-state fill sources.(34) OCLC staff analyzed the total use of the OCLC/ILL Subsystem during a nine-week period. Of some 80,000 requests, 91 percent had been verified and experienced a 97 percent success rate.(35)

Online bibliographic data bases have both simplified and improved the identification of fill sources.

Request Verification and Generation

Prior to the advent of electronic interlibrary loan, verification and generation of requests were manual operations performed by the borrower. Wood found in his 1968 study a 55.8 percent verification rate.(36) He also found that 5.4 percent of the requests were transmitted by telephone which resulted in the lender actually re-generating a request form.

Today, for many borrowers, verification and request generation have been combined by using the facilities of the bibliographic utilities. During 1981 at the Ohio State University (OSU) Libraries, 42.3 percent of the requests received arrived via the OCLC terminals and 73.2 percent of the requests OSU generated were transmitted to the lending institution via OCLC.(37) At MIT during 1980, 90 percent of the outgoing requests were verified and located online.(38)

The number of borrowers with access to online capabilities for request verification and generation is increasing as the number of online data bases applicable to verification and request generation increases. In addition to the bibliographic utilities (OCLC, RLIN and WLN), services provided by BRS, Dialog, SDC, CAS, and others offer online verification and request generation. While manual request verification and generation will remain an important part of the overall document delivery function, the use of the electronic verification and request generation will continue to increase.

Request Transmittal

Just as electronic interlibrary loan has changed the way requests are verified and generated, so also has it changed the way requests are sent from borrowers to lenders. In 1968, 88.5 percent of the requests were sent by mail, 5.5 percent by telephone, 2.2 percent by teletype, and 3.9 percent by courier.(39)

As shown by Table 7, electronic request transmission has captured a sizeable share of the request transmittal market.

Table 7

Percent of Document Requests Transmitted Electronically at Selected Institutions, 1981

Institution(s)	Percent
Ohio State Univ. Library	45.6
Mass. Inst. Technol. Library	50-60*
California Inst. of Technol.	16*
Univ. Colo., Boulder	58.2
Toledo-Lucas Co. Public Lib.	50
CAS Library	16.2**
Calif. State Univ. & Colleges (19 campuses)	95.1*
State Library of Florida	54.1

*Outgoing only **Incoming only

Further evidence of the growth of the use of electronic message transmittal is provided by OCLC ILL System statistics. The first million transactions were entered during the 20-month period April 1979 to November 1980. The second million required only twelve months.(40) The CAS Document Delivery Service (DDS) first offered electronic ordering in January 1981 and by the end of the year, 19 percent of the DDS customers were using this capability. During 1979/80 the Center for Research Libraries ordered 45,800 documents for other libraries via a direct computer link to the British Library Lending Division.(41)

Request Processing

The handling of incoming requests varies widely from lender to lender. Some check bibliographic records for ownership, originals and records for copyright status, circulation records for availability of owned items, and note location information, e.g., call numbers, on the requests to be filled. Other lenders check their shelves first, especially for serials reques Requests which specify whether a loan or a copy is wanted may or may not honored depending on library policy, e.g., some libraries will not loan local geneology and others will not make copies from film or fiche.

Items to be loaned must be charged out and prepared for shipping to the borrower. Pages to be copied must be identified, copied, and the original reshelved. The copies must be prepared for shipping.

In spite of attempts over the years to mechanize the storage, retrieval, and duplication of books and serials (none were both successful and economically viable), the request processing component of document delivery has not undergone substantial change since the introduction of the high speed copying machine, e.g., the Xerox 914.

Requests sent to information brokers such as Information on Demand are processed by the brokers' staff who depend upon library collections (usually but not always local) for originals from which they make copies or have copies made.(42) Although the personnel involved are different, the process of retrieving the original, making the copy, and returning the original is quite similar to that for requests received directly by a library.

A few libraries as exemplified by NLM have introduced innovations to make document request fulfillment less labor intensive and costly. Most, however, handle increases in volume by adding staff or by imposing restrictions or charging fees to discourage would-be borrowers and slow down unwanted growth.

Loan and Copy Transmittal

The actual transfer of originals and copies from lending to borrowing institutions is for the most part by way of the U.S. Postal Service, United Parcel Service or courier. Little use is made of air express package services, USPS express mail or telefacsimile. Courier service provided by networks, consortia and other cooperative programs has the advantage of rapid delivery.(43) Courier service also reduces the time and materials lenders must spend on preparing documents for shipment. Facsimile transmission, though tried by several

libraries and still available from some, has not proved to be a viable option for copy transmittal. Equipment incompatabilities coupled with slow transmission speeds (minutes per page) and high telecommunications costs are the reasons usually given for the negligible use of facsimile transmission.(44)

The CAS Document Delivery Service during 1981 shipped 80 percent of the originals or copies by first class or airmail, 18.5 percent by UPS, 1.0 percent USPS Express Mail, and 0.5 percent by air express package service.

Payment of Fees

Virtually all, if not all, commercial fill sources (lenders) and many library lenders charge fees of some kind. The fee may be charged to out-of-state borrowers only, to specific categories of borrowers, to cover direct costs (e.g., photocopying), to recover full costs, or to recover full cost plus provide a margin of profit. Fees may be charged for "Rush Service" or other special handling.

A review of the document delivery literature published since 1976 disclosed no information on aggregate revenues derived by commercial and library lenders from the document delivery business.

Some of the less obvious fees involved in document delivery are:

1. Fees borrowers pay to transmit messages.

   - OCLC handled 940,000 interlibrary loan transactions in FY 1980/81 and charged, $0.95 per transaction (raised to $1.20 for FY 1981/82). This does not include network surcharges.

   - Users of Dialog Dialorder pay the connect hour charge for the data base being used.

   - Users of SDC Electronic Maildrop pay $35 per connect hour plus telecommunications charges.

   - Users of the California Union List of Periodicals on BRS will pay $20 per connect hour plus telecommunications charges.

2. Fees lenders pay to receive messages.

   Lenders retrieving document requests from Dialog Dialorder or SDC Electronic Maildrop pay Dialog or SDC $35 per connect hours, telecommunications charges, plus $0.25 per request. For example, it costs CAS about $0.50 to retrieve a request from Dialog Dialorder.

3. Fees lenders pay to copyright owners or their agents.

   It is presumed that some libraries abide by the CONTU Rule of Five and pay copyright royalty fees. There is little in the literature that would provide an indication of the aggregate amount of money spent by either borrowers or lenders to pay such fees. However, during the

period September 1980 - June 1981 CAS paid the Copyright Clearance Center, Inc. an average of $2.18 per copyrighted, registered document copied.

One ARL library that charges fees for providing copies or originals and that asked not to be identified reported that it probably spent more money attempting to collect its "ILL fees" than it brought in. This is probably the situation at other libraries and commercial fill sources.

Return of Originals

Lenders that fill borrowers' requests by lending originals have the added tasks of processing the loaned items upon receipt from the borrower. This generally involves canceling the charge and reshelving the original. It can become more involved when originals are not returned or lost in transit. Insurance claims must be filed, borrowers billed, and decisions made whether or not to attempt to replace the lost original.

SECTION III: THE NEAR-TERM FUTURE(*)

This section presents an attempt to predict changes that will occur in the document delivery process during the next five years, between now and 1986. These predictions are based on conservative projections of current status and trends experienced over the past decade. While the long-term future may bring into play widespread usage of video discs and satellites or some future technology, such widespread usage probably will not become an economical option for some years to come.

Given the current state of the economy, the changes that are most likely to occur will occur gradually between now and 1986. There is nothing on the horizon that would indicate anything other than a continuing evolution of the document delivery business in the near-term future.

The major changes that will occur during the next five years are:

- Demand for documents or document copies from off-cite sources will continue to increase as more online searching is done and as the percent of requests that can be filled from local stocks decreases.

- The number of requests transmitted from borrower to lender via electronic means will increase as the bibliographic utilities' data bases become accessible to more libraries and the content of these data bases

---

(*) The opinions expressed in this section are those of the author and do not necessarily reflect policy or positions held by the Library of Congress, the Network Advisory Committee or the American Chemical Society.

continues to be enriched. This is especially true for requests for serials. More data base distributors will offer electronic ordering. It will be possible to order documents electronically directly from data base producers, e.g., ISI or CAS, or from online access to regional or subject oriented union lists.

- The number of private sector document copy providers probably will not increase dramatically. Those that exist will be the ones that provide responsive and competitively priced services. These private sector providers will capture an increasingly larger share of the total market, especially the for-profit special library segment. As more and more public sector fill sources, i.e., libraries, charge for document delivery and, as these charges increase, the cost differential between acquiring from a public versus private sector fill source will diminish appreciably.

- The amount of for-free document delivery will diminish and the amount of for-fee document delivery will grow. Borrowing institutions or their patrons or end users will be paying more, not less, to satisfy their document needs.

- In regard to lenders' processing of requests, little change is seen. The bibliographic utilities could assist by providing certain accounting functions, but this seems unlikely in the near term.

- As postal rates increase, courier services will become more economically attractive for local and regional delivery of both requests and copies or originals.

- There will be a gradual shift to electronic delivery of copies with the introduction of high-speed telefacsimile equipment, but the percent of the total copies delivered that are transmitted electronically will remain very low.

- Selection of express delivery (USPS Express mail, Federal Express or other air express package services) for originals and copies by private sector borrowers will increase.

- There will be a few publishers that will provide electronic delivery of full text, but the aggregate will be only a fraction of a percent of the full text that will not be available from some kind of electronic storage. Revenues from document delivery alone cannot support the expenses associated with full text storage, retrieval and transmission.

- The libraries and commercial fill sources present today will not be supplemented by yet-to-be created fill sources. While the Center for Research Libraries may evolve into a more active participant in the overall document delivery business, especially with its computer-to-computer link to the British Library Lending Division (BLLD), the prospects of the United States having by 1986 a National Document Delivery System (read National Periodical Center) is indeed remote.

EPILOGUE

The impetus to do something about document delivery comes from many sectors. Each sector has a vested interest. Library patrons and other end users want fast, low cost (or free) access to information. Net lender libraries want relief from an increasing drain on their resources. Net borrowers want not to become net lenders. Copyright owners want compensation for perceived financial losses. Commercial or private sector providers want a favorable balance between their expenses and revenues. Bibliographic utilities want to increase the use of their systems for request transmittal. Document delivery is. It will not go away. Improvements are needed. The challenge in making them is to take actions that do not benefit some at the expense of others.

REFERENCES

(1) American Library Directory, 34th Edition. Ed. by Jaques Cattelle Press (New York: R. R. Bowker Company, 1981) 1872pp.

(2) Document Retrieval Sources and Services. Ed by Martha D. Strizich and Kathryn S. Lawhun (San Francisco: The Information Store, 1981) 209pp.

(3) King Research Inc. Library Photocopying in the United States (Washington, D.C.: US Govt. Printing Office, 1977) 203pp.

(4) Private communication with Carol A. Mandel, Associate Executive Director, Association of Research Libraries.

(5) James L. Wood, A Review of the Availability of Primary Scientific and Technical Documents Within the United States (Bethesda, MD: ERIC Document Reproduction Facility, 1969) Vol. I, p.4 (ED 046-437) and Vol. III, Appendix 28, (ED 046-439).

(6) Ann T. Dodson, Paul P. Philbin, and Kunj B. Rastogi, Electronic Interlibrary Loan in the OCLC Library: A Study of its Effectiveness (Dublin, OH: Online Computer Library Center, Inc., 1981) p.2.

(7) "Resource Sharing and Interlibrary Loan," MINITEX Messenger 5(4) 1980, p.9.

(8) Private communication with Virginia Boucher, Interlibrary Loan Service, University of Colorado at Boulder.

(9) Michael L. Herman, Idaho Interlibrary Loan: A Study of Fill Rate, Turnaround Time, Patron Satisfaction, and Characteristics of Requests (Bethesda, MD: ERIC Documentation Reproduction Service, 1978) p.11 (ED 165 749).

(10) California State Universities and Colleges, Northern Library Regional Cooperation Board, Northern Network Committee Interlibrary Loan Survey Report (Bethesda, MD: ERIC Documentation and Reproduction Service, 1978) p.9 (ED 167 162).

(11) Private communication with Paul Peterson, Linda Hall Library, Kansas City, MO.

(12) "The British Library Lending Division in 1980-81," Interlending Review 9(3)1981, p.75.

(13) California State Universities, Northern Network, p.8.

(14) Dennis J. Reynolds, "Regional Alternatives for Interlibrary Loan: Access to Unreported Holdings," College & Research Libraries 41(1) 1980, p.39.

(15) Ann T. Dodson, Electronic Interlibrary Loan, p.12.

(16) "MINITEX: A Status Report, November 1980," MINITEX Messenger 6(3)1980, p.3.

(17) David Ferriero, "Impact of OCLC on Interlibrary Loan at MIT," Research Libraries in OCLC: A Quarterly, No. 3, July 1981, p.3.

(18) Jo Ellen Herstand, "Interlibrary Loan Cost Study and Comparison," RQ 20(3)1981, p.249.

(19) King Research, Inc., Library Photocopying, p.38.

(20) Private communication with James P. Riley, Federal Library Committee.

(21) "Serials Collections in a Network Environment," MINITEX Messenger 6(4)1981, p.2.

(22) Betsy L. Humphries, "NLM's National Biomedical Holdings Data Base" National Library of Medicine News 36(5)1981, p.1.

(23) See No. 11.

(24) Betsy L. Humphries, "NLM's National Biomedical Holdings Data Base" National Library of Medicine News, 36(5)1981, p.1.

(25) Beginning in April 1982 documents cited by CAS may be ordered from the CAS Document Delivery Service via CAS ONLINE.

(26) "California Serials List Goes Online with BRS," Library Journal January 15, 1981, p.134.

(27) Directory of Online Data Bases, Vol. 3, No. 1 (Santa Monica, CA: Cuadra Associates, Inc. 1981) p.5.

(28) "Member Service Statistics," NFAIS Newsletter, 23(1)1981 [between pp.20-21].

(29) Roger K. Summit, "The Challenge Continues," Chronolog 9(12)1981, p.81:181.

(30) Ronald E. Diener, "Information Data Base Services, 1980/1981," OHIONET ADMEMO, No. 26, 1980, 8pp.

(31) Dorothea M. Thompson, "The Correct use of Library Data Bases Can Improve Interlibrary Loan Efficiency," Journal of Academic Librarianship 6(2)1980, p.83.

(32) "Serials Collection in a Network Environment," MINITEX Messenger 6(4)1981, p.3.

(33) Robert S. Gorin and Ronald A. Kanen. Florida Library Information Network Project: A Comparative Study of OCLC, TWX, U.S. Mail, and Closed-Circuit Teletype (Tallahassee, FL: State Library of Florida, 1981) p.17.

(34) Johanna E. Tallman, "The Impact of the OCLC Interlibrary Loan Subsystem on a Science Oriented Academic Library," Science & Technology Libraries 1(2)1980, p.31.

(35) Ann T. Dodson, Electronic Interlibrary Loan, p.2.

(36) James L. Wood, A Review of the Availability of Primary Scientific and Technical Documents Within the United States (Bethesda M.D.: ERIC Document Reproduction Facility 1969), Vol. II, p.105.

(37) Private Communications with Larry X. Besant, Ohio State University Libraries.

(38) David Ferriero, "Impact of OCLC on Interlibrary Loan at MIT," Research Libraries in OCLC: A Quarterly No. 3, July 1981, p.2.

(39) James L. Wood, A Review of the Availability of Primary Scientific and Technical Documents Within the United States (Bethesda M.D.: ERIC Document Reproduction Facility, 1969) Vol. II, p.76.

(40) OCLC Press Release, December 15, 1981.

(41) "The British Library Lending Division in 1979/80," Interlending Review 8(3)1980, p.82.

(42) Barbara Newlin, "The 200 Questions," Library Journal January 15, 1981, p.151.

(43) Dennis J. Reynolds, "Regional Alternatives," p.37.

(44) Richard L. Walters, "Telefacsimile: An Effective Document Transfer Tool," Serials Librarian 4(2)1979, pp.215-218.

EXPLANATIONS OF ACRONYMS

ARL	Association of Research Libraries
BLLD	British Library Lending Division
BRS	Bibliographic Retrieval Service
CAS	Chemical Abstracts Service
CASSI	CAS Source Index
COM	Computer Output Microfilm
CONTU	National Commission on New Technological Uses of Copyrighted Works
CULP	California Union List of Periodicals
Dialog	Dialog Information Retrieval Service
ILL	Interlibrary Loan
ISI/OATS	Institute for Scientific Information, Original Article Tear Sheet
MEDLARS	Medical Literature Analysis and Retrieval System
MINITEX	Minnesota Interlibrary Telecommunication Exchange
MIT	Massachusetts Institute of Technology
NAC	Network Advisory Committee
NCES	National Center for Educational Statistics
NFAIS	National Federation of Abstracting and Indexing Services
NLM	National Library of Medicine
NST	New Serial Titles
NUC	National Union Catalog
OCLC	Online Computer Library Center, Inc.
RAL	Register of Additional Locations
RLIN	Research Libraries Information Network

SDC	Systems Development Corporation
SERLINE	Serials On-line
UPS	United Parcel Service
USPS	US Postal Service
WLN	Washington Library Network

DOCUMENT DELIVERY TECHNOLOGY:

A Brief State of the Art Review

By

M. E. L. Jacob
Director for Library Planning

with the Assistance of OCLC Technical Staff
OCLC

February 8, 1982

A number of technologies affect document delivery in libraries. These include such diverse areas as communicating copiers, satellite transmission, cable tv, electronic mail, the Kurzweil Reading machine, optical character readers, printers, videodisc, computer microfilm technology, computers and associated peripheral equipment. This list is by no means exhaustive. Such diverse disciplines as electronics, printing, librarianship, communication sciences, data processing, publishing, optics, and records management are concerned with the many problems of information storage, retrieval and delivery.

Much of current technology is either still in the developmental stage or too costly to be used in the library environment, but this picture is changing rapidly. What is not changing so quickly is user behavior and patterns of information access and use. Attached to this paper is a selected bibliography indicating some of the variety of equipment and techniques, currently or soon to be available. In particular, the two issues of EDN and Electronic Design focus on the technology. I have included a number of references from library publications to provide insight into possible library uses.

It is difficult to provide an ideal categorization for discussing technology for document delivery. There is overlap no matter what approach is chosen. Some devices and technology provide a continuous process, not a discrete one. Nonetheless, I have considered four major areas: input, storage, communication, and output. These are purely arbitrary, but fit actions and activities we are familiar with.

INPUT

Input devices depend on the point in the process we are at. Many new journals are being created in machine readable form through existing computer technology. A number of references have been included on electronic publishing. In particular, Hickey (24) provides an overview of this area and some of the technical considerations. Of considerable interest to libraries is how older information, not currently in machine readable form, can be converted or at least transmitted electronically. Considerable activity is under way in the area of videodisc, electronic imaging, and optical storage. Williams (9) provides an overview of present and near term activities. These areas are discussed further under the section on storage.

Two areas of particular interest to libraries are the development of the Kurzweil Reading machine and optical character readers.

The Kurzweil machine converts printed text into spoken word for use by blind or visually impared people. It will accept a variety of printed materials including bound books. It operates on OCR, optical character reading and pattern matching techniques.

Optical character reading has and continues to improve. More fonts, as well as hand printing and in certain instances scripts, can be handled. Unfortunately a low cost machine, providing even all printed fonts, is not yet available. Continued development of the Kurzweil machine, as well as language translation uses, indicates more improvements will be forthcoming. Digitizing of images and their transmission may reduce the need to actually convert print material to machine intellible or interpretable information. The ability to scan it and transmit it without further manipulation may be sufficient for many document delivery applications. Another area of interest for input is the development of communicating copiers. This provides input, output and transmission in one process. It is an interesting extension of present photocopying processes. With such facilities a library instead of making and mailing a photocopy does it in one step. Making a copy in one library creates a copy on a machine located in another library. At present, this is an expensive process, but costs are certain to fall in the future. It is really not greatly different from telefacsimile. The end product is very similar, but it eliminates the need for a separate, single purpose machine. A communicating copier can be used for both copying and for telefacsimile.

Telefacsimile has been around for some time, and several experiments have been undertaken in the library community. Most of these have failed primarily because of cost, quality problems, and inconvenience. These factors are changing rapidly. While costs are still higher than most librarians would like, they are affordable for certain uses. Many businesses are beginning to use telefacsimile and, as locations of machines increase, so does their accessibility to libraries. Bound volume problems will eventually disappear, but it is not yet clear where and when telefacsimile will merge with communicating copiers.

STORAGE

Much has been written about the potential of videodisc for use in libraries and for document storage. The Library of Congress, the National Library of Medicine, and numerous other organizations are active in applications of this technology. Recently a group

of European publishers have announced intentions of converting large numbers of journals into a similar storage media, although they are quick to point out differences in the techniques they use from video technology. For our purposes, however, they are sufficiently similar to be grouped together.

These latter technologies - videodisc, optical and digital image storage, magnadot, etc. - offer interesting facilities for document preservation and storage. The image quality, the cost, and ease of use are improving.

In addition to video storage, we will see continued development of other storage technologies. These are discussed more fully by Williams (9). Magnetic media such as magnetic disc capacity will continue to improve. We will see greater capacity in all disc storage, including 50 million bytes on floppy discs. Hard disc, those used on most larger computer systems, will also increase capacity and reduce costs. More exotic memory storage technologies will also appear. Holographic image memory has some interesting potential for nontraditional materials storage, but perhaps less impact on the type of materials we are normally concerned with in document delivery.

COMMUNICATION

Communication technology also is developing and improving. Again Williams (9) offers an overview of this area. Satellite communication, fiber optics, and digital techniques are providing more, lower cost options that are less distance dependent. Continued developments and reduced costs in this area are essential for effective information delivery systems. Pressure for continued development will come not only from libraries but all aspects of society.

A number of factors will affect future developments and availability of technology. Not least among these include the social and political factors associated with the recent settlement of the antitrust suits against IBM and AT&T. The latter is of particular importance to the development of telecommunications.

Cable tv has been coming for some time. Its impact is still somewhat limited by the physical distribution system. Not all areas have cable tv service. Some physical limitations of tv output is discussed more fully under output. At present, the physical medium is best suited to conveying limited amounts of

current information, and does not offer major assistance for document delivery.

OUTPUT

Output may be of two main types: soft or hard. Soft output would normally appear on some type of display unit, a conventional CRT or television screen. Such displays are adequate for much material, but not for high quality graphics. Limited amounts of printed information can be displayed effectively on a television screen. These limitations are a function of present U.S. and European signal standards controlling display resolution. A full encyclopedia page would have to be displayed in small segments requiring a number of screens. In addition, there have been numerous studies documenting the fatigue effects of long hours of CRT use. Present equipment leaves much to be desired as a user cordial medium for visual language presentation.

Technology may improve, and certainly access and available alternatives will have much to do with user acceptance of soft copy output. It is well suited to conveying ready access to information of a limited volume. Electronic mail and conferencing systems indicate users can overcome inherent deficiencies, although there are a number of users of such systems relying on printer units instead of CRTs.

The slow acceptance and use of microform technology indicates some of the problems to be faced and overcome before soft copy can be viewed as a substitute or an effective replacement for hardcopy, printed output. Some aspects of these problems are discussed by Line (3).

The second major type of output is hardcopy; this includes microform as well as printed output. Hickey (23) outlines the problems, considerations and the future for printed output. In addition to the improvements he sees, we must also add better telefacsimile output and communicating copier output. Printed output is a relatively bright spot in the technological area. Better quality, cheaper, more reliable printers are being developed and marketed. Newer technology, such as ink jet and laser printing, offer more improvements for the future.

Microform technology also continues to improve. Communicating copiers offer potential in not only paper output, but also microform. This could be useful in allowing high speed

transmission between distant centers, such as internationally, while using conventional services such as mail or UPS between centers and local libraries. This would be an interim solution reducing overall costs of delivery until low cost units for library use were available.

SUMMARY

The current state of document delivery leaves much to be desired. While we can locate quickly through online services document citations, locating the document itself is still a time consuming and often frustrating process. We are still relying on older technologies for delivery of the document itself. There have been a number of experiments with facsimile techniques, but none have been an unqualified success. The NSF sponsored study undertaken by the American Institute of Physics did demonstrate that the technology will work, but there are still significant problems to resolve on the use side. The suggestion in the project report of removing access to printed journals may satisfy a researcher or a technologist, but leaves much to be desired from the user perspective. Some of these issues are articulated by Line (3). He offers no solutions, but raises a number of interesting and important questions.

So where are we at present? Do we have the technology to improve document delivery? Yes. Can libraries afford this technology? Only in a few cases. Is there sufficient material in a suitable form to use these technologies? No.

In the near term we can see improvement. Technology is offering more capability with improved quality at a reduced cost. Current information is being created and stored in machine readable or digitized form. Research by institutions like the Library of Congress, the National Library of Medicine, OCLC, library schools as well as numerous technical firms, such as computer manufacturers, AT&T, Xerox and others, will provide more cost effective technology applicable to library use.

Major problems we still face are less technical than people oriented. We must consider how we preserve and make existing collections accessible, how we can either overcome user preferences, or better, how we can adapt the technology to more effectively meet user needs and preferences. Libraries have a choice of many roles, as do publishers, printers and information

services. All can try to retain traditional roles, or they can work together seeking new patterns of relationships and activities. None will have a monopoly on all the information needed by users. The limits are not the technology, but how we use it.

BIBLIOGRAPHY

General

1. Branscomb, Lewis M. Information: the ultimate frontier. Science. 203: 143-147; 1979 January 12.

2. Kaske, Neal K.; Sanders, Nancy P. A library at your fingertips - the impetus and implication. Presented at the telecommunication conference; 1981 November 30; New Orleans.

3. Line, Maurice B. Libraries and information services in a post-technology society. Journal of Library Automation. 14(4): 252-267; 1981.

4. Document delivery. Link. ORM 1(6); 1980 October.

5. Doradick, Herbert. Information inequality. Computer World. Indepth 1-4; 1980 April 21.

6. Lancaster, F. Wilfrid, ed. The role of the library in an electronic society. Urbana-Champaign, Illinois, University of Illinois Graduate School of Library Science; 1980.

7. Lerner, Rita G.; Mick, Colin K.; Callahan, Daniel. Database searching and document delivery via communications satellite. New York, AIP; 1980 June; AIP80-81, PB81-153314.

8. Turtle, H.; Penniman, W.D.; Hickey, Thomas B. Data entry/ dispaly devices for interactive information retrieval. Williams, Martha E., ed. Annual Review of Information Science and Technology.

9. Williams, James G. Information technology - a state of the art. Pittsburgh Conference; 1981.

Cable TV

10. Wilk, Max. Cable tv - hope or hyse. D & B Reports. 4-9: 1980 September/October.

Communicating Copiers

11. Arnett, Thomas L. Intelligent copiers-printers can save you time and labor. The Office. 155-158; 1981 November.

12. Fukae, Ken. What computer technology is doing for copying machines. The Office. 104; 1980 March.

13. Hanson, Richard E. Copiers: intelligent and otherwise. Administrative Management. 32-33, 73; 1980 December.

14. High speed communicating copier demonstrated. The Office. 101; 1980 August.

15. Datagraphix COM unit offers remote imaging. Computerworld. 65-66; 1982 January 25.

16. Electronic document transmission helps cut mailing costs, while integrating easily with existing equipment. Administrative Management. 75-76; 1981 October.

17. Electronic mail and the U.S. postal service. Datapro Automated Office Management Newsbriefs. 4(11): 1; 1981 November.

Electronic Publishing

18. Adonis project plans demand printing of STM articles. Advanced Technology in Libraries. 2; 1981 July.

19. Dahlin, Robert. Watch that book. Publishers Weekly. 219(12): 24-30; 1981 March 20.

20. Doebler, Paul D. The computer in book distribution. Publishers Weekly. 218(11): 25-41; 1980 September 12.

21. EURIM 4: a european conference on innovation in primary publication: impact on producer and user. Anthony, L.J., ed. London, ASLIB, 1980 March 23-26.

22. Frank, Jerome P. New electronic developments abound at 'Laser' conference. Publishers Weekly. 35,37; 1982 January 1.

23. Hickey, Thomas B. The coming revolution in document delivery.

24. Hickey, Thomas B. The journal in the year 2000. Wilson Library Bulletin. 256-260; 1981 December.

25. Link. Publishing industry activities in the new electronic media. ERM 2(8); 1981 May.

26. Link. Strategies for magazine publishers in the new electronic media. NRR 2(1); 1981 April.

27. Rebsamen sees shorter runs leading to books-on-demand surge. Publishers Weekly. 220(1): 123; 1981 July 3.

28. Shotwell, Robyn. Books on demand-1. Publishers Weekly. 219(7): 47-48; 1981 February 13.

29. Shotwell, Robyn. Books on demand-2: what's happening now. Publishers Weekly. 219(?): 51-52; (?).

30. Shotwell, Robyn. Getting into database publishing: some possibilities and pitfalls. Publishers Weekly. 220(11): 45-46; 1981 September 11.

Input

31. Cushman, Ruth-Carol. The Kurzweil reading machine. Wilson Library Bulletin. 54(5): 311-315; 1980 January.

32. Sachs, Randi T. OCR page readers: lower cost, more flexibility. Administrative Management. 39-40, 66; 1980 December.

33. Weinberg, Belle, The Kurzweil machine: half a miracle. American Libraries. 11(10): 603-604, 627; 1980 November.

34. Electronic technology...the next 25 years. EDN Magazine. 26(20); 1981 October 14.

35. 1982 technology forecast. Electronic Design. 30(1); 1982 January 7.

Telefacsimile

36. Barr, Dan; Porter, Jim. Don't ignore facsimile supply costs. The Office. 118-119; 1981 November.

37. Facsimile transfer - can libraires operate it? Incite. 2(11): 1; 1981 July 3.

38. Marcum, Deanna; Boss, Richard. Information technology. Wilson Library Bulletin. 206-207; 1981 November.

39. Saffady, William. Facsimile transmission for libraries: technology and application design. Library Technical Reports. 14(5): 445-531; 1978 September/October.

40. Today's facsimile systems - where do they go from here? The Office. 135, 137-138, 143, 147-148, 152; 1981 November.

41. Waters, Richard L. Telefacsimile: an effective document transfer tool? The Serials Librarian. 4(2): 215-218; Winter, 1979.

Video

42. Bahr, Alice Harrison. Video in libraries: a status report, 1977-80, 2nd ed.

Videodisc

43. Abbott, George L. Videodisc bibliography: technical articles. Videodisc/Teletext 1(2): 120-129; Spring 1981.

44. Sigel, Efrem. Video discs: the technology, the applications and the future by Efrem Sigel, Mark Schubin and Paul F. Merrill. 1980.

Viewdata

45. Viewdata - a product in search of a market? Telecommunication Policy 4(1): 221-225; 1980 September 3.

46. Viewdata - subscription or commercially supported? Datapro Communication Management Newsbrief. 3(4): 1-2; 1981 April.

LIBRARIES IN THE YEAR 2000

Prepared by

Susan H. Crooks
Arthur D. Little, Inc.

for the

Library of Congress
Network Advisory Committee

March 1982

BACKGROUND

This paper is intended to provide the Library of Congress Network Advisory Committee with a framework for creating a planning scenario of what the future holds for libraries. The Network Advisory Committee's particular concern at this time is to set directions in the areas of document delivery and storage technology. Since years will pass before work undertaken now will have effect, the challenge is to assure that results ten years hence are relevant to information-using habits and institutions at that time.

Introduction

The librarians, library administrators, and other leaders in the library world and information industry to whom this paper is addressed have thought about what libraries will be doing by the year 2000. Extreme positions on this question assert either that the library as we know it will not exist at all, or that business will proceed as usual, although some different technologies surely will be in use. This paper takes an intermediate position: There is reason for very serious concern for the survival of libraries, but there also is reason for believing that vital roles for libraries will continue.

Satisfactory discourse on this topic is difficult. Futurist stances must simplify the complex factors influencing the course of development in order to evoke usefully vivid images. Yet, in doing so, futurists risk offending those who have invested enough in today's reality to have some chance of influencing the projected future.

In addition, our common terminology and personal definitions of libraries' roles can cause misunderstanding in discussions of the future of libraries. For example, my model in beginning to work on this paper was something like the following:

(1) Libraries basically serve as an intermediary in the market for ideas.

(2) Next to oral communication, print is still the principal tool for conveying ideas.

(3) Books, journals, and newspapers are the primary forms today for print.

(4) Libraries primarily acquire, organize, and disseminate materials in these forms--bringing together sources and users from a range of places, disciplines, historical periods, and levels of sophistication--to convey ideas.

In developing this paper I have had long-term arguments with colleagues in the field before we understood that, while our models might differ, our views about the key challenges libraries face did not. In addition, my own model changed. It became a model which asserts that the activities which take place in the library are broader than "intermediation." Libraries provide a setting in which people add to or exchange ideas (and learn and find entertainment) and in which people share the experience of working with ideas. Print and books are one--but not necessarily the only--tool to be used in this setting. Buildings and the physical environment have far more than the incidental role I first perceived them to have. People can use information without having anything to do with a library--therefore its institutional presence is a critical part of its role.

Approach

The year 2000 is only 18 years away. Yet in my life I have already seen as much change as my mother has seen in her lifetime of twice as many years as mine, so I expect those 18 years to bring about change that I cannot anticipate. Since we are unable to see clearly what life in the year 2000 will be like, I have worked stepwise to develop a view--by:

- Building a rough projection of developments in five technological areas. I believe these developments will create substitutes for current library services and will influence important societal structures and practices related to information use.

  (Appendix I describes where substitutions for library functions will occur as a result of developments in: home computers, video disc, Videotex, integrated office information systems, and other developments in the information industry related specifically to electronic publishing.)

- Accepting the proposition that by the year 2000 substitutes could be in place for nearly all services libraries perform today.

- Finding images of future library services to visualize the fundamental changes to library roles that <u>can</u> happen.

Where libraries end up does not depend primarly on technological developments, market developments, or whether or not print survives. Libraries--public, academic, and research--will utilize new technologies. But if libraries have what it takes, other information age institutions and companies will, too.

The implications of this line of thinking are important. That is, the question is not whether libraries can beat other information providers in utilizing new technology to satisfy information needs. The question is: what users' needs can libraries uniquely meet in the year 2000? Therefore the framework that yields the most dependable view of libraries' future in 18 years is: can users' and supporters' conception of the library's role be implemented in year 2000 services?

SETTING THE STAGE

The primary purpose of this paper is not to describe technological changes influencing libraries between now and the year 2000. The papers prepared by Jim Wood and Mary Ellen Jacob for this meeting discuss several of the most important present institutional forms and future trends for document delivery and storage. This paper is meant to choose and characterize key aspects of libraries and their environment in 2000 AD. Impacts of technology will, of course, show up in these characterizations.

Many of the changes with the most influence on libraries will take place in other parts of the information industry and outside it. The following kinds of events are to be imagined--to set the stage for the library scenarios which follow and to indicate an important premise: Features of the environment for information services we take for granted are likely to be altered in unexpected ways, making seemingly improbable courses of events probable.

Deregulation of Cable Television

Cable television operators' total control over content disappeared in the late 1980s. Publishers, motion picture producers, and home information services had brought antitrust proceedings. These actions forced cable systems to become common carriers, providing delivery services on an equal basis to all commercial parties. Considerable turmoil resulted, since all the new potential offerers of information over this channel had to make new institutional arrangements.

Major changes occurred in information and entertainment delivery systems--especially in the number of broadband channels entering homes and businesses:

- Large multichannel cable systems with more than 50 channels become widely installed, offering both free and paid entertainment and information services; as a result, fewer people went to movies, more people had incentive to get cable, and more entertainment programming was developed for cable.

- Satellite receive-only antennas were used for low population density areas. Where cable was not the most efficient means, video discs were utilized for their capacity to store very large amounts of information.

- By the late 1990s, cable was available in the large majority of homes.

New content and transaction delivery systems developed to use these channels. The systems helped make these changes economically feasible. They also increased users' computer literacy. The range of services--financial transaction, and shopping at home, for example, plus information services such as news, directories, and reference material--accustomed users to the idea of conducting varied interactions over terminals to meet their own information needs.

Finally, new institutional arrangements began to develop by the late 1990s. Business publications increasingly diverged. Electronic publishing through data bases was used for fact-based and problem-solving information. Trade journals in print form continued to be published. Much experimentation occurred to determine how scientists and engineers would in fact write, publish and use information in an environment allowing terminal-to-terminal literature searching and communication. Scientific and technical journals were published electronically in various forms through joint ventures among publishers, associations, and companies operating telecommunications networks. Use of local newspapers in soft copy form began to equal use of printed newspapers, although national newspapers such as The Wall Street Journal and The New York Times maintained a healthy print circulation in addition to their growing electronic services.

Improved Work Performance With VDTs

Research on the user interface was carried out during most of the 1980s. This was broadly defined; it included research on information access tools, such as book indexes, which users liked using to complement the language and structures they used in formulating retrieval problems for themselves. It also included research on the media used to store information.

In 1988 study results indicated a surprising fact. Once users relaxed their assumption that information used in text form needed to come in fixed nonvolatile chunks, comprehension was, in fact, improved through the use of video display terminals. Users of scrolled high resolution screen displays were no more tired than print users and found it easier! The library profession could only look at past wisdom that users of display screens performed less efficiently and remember cigarette advertising from the 1930s--which claimed a few cigarettes smoked after meals aided digestion.

Rapid Penetration of Computers in Schools

As anticipated, the use of computers in education took off in the first half of the 1980s. Developments which made this possible occurred more or less on time, beginning with computer games early in the decade, and later supported by interactive games such as Adventure and Dungeon available on a surprisingly large percentage of home computers.

The most important influence in stimulating widespread experimentation and innovation, however, was a set of heavily funded computer-aided instruction projects on a carefully selected group of 15 state university campuses that served a mixture of high income suburban areas and urban areas with upwardly mobile populations. The participants in these experiments became a core of students heavily exposed to the most advanced educational computing--most from early high school years, a few from the mid grade school years.

Within a decade, the educational community all over the United States had acted on the implications of these experiments. In what might otherwise have been a slow moving situation, local pride and family pride drove consumers to demand that education catch up with homes, offices, and factories. Public school parents insisted on having a wide range of tools for computer-assisted instruction to provide their children training equal to that received by students in private schools equipped with state-of-the-art facilities. Graduating high school students demanded college facilities which capitalized on their computer-intense high school backgrounds. Schools with the best reputations included computer literacy in the curriculum and in facilities and library budgets. The best students did not want to attend institutions that lacked instructional programs and library and other information support that would prepare them as they knew their peers were being prepared to use computers in the working world.

A Terminal in Every Home

In the early 1980s United States citizens aware of international trends made skeptical comparisons between the evidence of the information age in United States homes and France's program to place Teletel terminals in the homes of all French citizens. Distribution of this advanced technology to all homes was exciting, but it would never happen in the United States. (By this time in the United States, 98 percent of homes had telephones and televisions, and almost 85 percent had automobiles.)

By the late 1990s, in fact, there were as many United States homes with some form of interactive voice, image and data terminals as there had been homes with automobiles 15 years earlier. This was not the result of government thrusts either to stimulate domestic high technology industry nor to assure common access to new technology. It was the consequence of continued technological innovation and competition in a society still emphasizing mass consumer goods and services. You didn't live in the 1990s without this linkage to mass markets and mass culture.

SCENARIOS: LIBRARIES IN THE YEAR 2000

The scenarios indicate important aspects of libraries' roles and services in 2000. They are not meant to dramatize exactly how libraries would use new technology or how users would make substitutions using newly available information products and services. Rather, the scenarios indicate:

- The line of development that could bring about the changes described.
- The kinds of information technology we might expect to see in use in various kinds of libraries in the year 2000.
- The increased difference among types of libraries (and among different libraries of the same type) as well as the ways each retains very basic elements of its 1982 identity.

The scenarios below do not include a year 2000 version of a special library serving either business or scientific and technical information users. The academic library scenario does, however, include themes (consolidation of institution information facilities, for example) which also will be important in the course of development of the special library over the next 18 years.

PRINTED TEXT SERVICE WITHOUT BOOKS--The Classics Reading Company

History

The Classics Reading Company provides the equivalent of circulation services for current and retrospective books. (It could provide the same service for journals, or a subsidiary or a related company could do so; this role is not considered in the discussion below.) The Company owns no physical books; it provides book text via broadcast or cable delivery.

Characterization

The Classics Reading Company was formed in the late 1980s by a group of entrepreneurs who decided that for the next few decades information would be supplied in a variety of forms by a range of packagers. The new company was not intended to be the sole local distributor of book texts--its founders believed that information would be delivered to users in the home by at least libraries, publishers, computer services such as The Source, and the broadcast media.

The Classics Reading Company was also established on the premise that different users had different information using needs and styles. And a small, but significant, proportion of the reading public--business and professional users familiar with personal terminals--already was accustomed to using information in soft copy without an intermediary. The Classics Reading Company's initial target market was, therefore, users accustomed to controlling equipment and services to meet their own information needs--users who would be willing to read text delivered via their home television screens.

Physical Plant and Location

The Classics Reading Company's center of operations is a broadcast facility in a major city. Over-the-air broadcast is used for transmission. In addition to transmission equipment, the plant includes video disc and microfiche storage and reading equipment. For newer publications, produced for printing in machine-readable form, video discs are used for storage; for older publications, microfiche is employed, with a laser scanner to convert the text to electronic form. In both cases automatic pickers are used to retrieve the desired items.

The Classics Reading Company accommodates a huge number of readers without using cable--it was established before the capital investment required for cable had been made in its community. Some of the companies with franchises from The Classics Reading Company use cable.

Jurisdiction

The Classics Reading Company is a private sector enterprise--a joint venture between a local broadcast company and publishers owning the machine readable copy to create the discs or microfiche. The Company franchises the operation in other cities.

In order to provide texts of books printed before photocomposition-produced masters were available, the firm contracts with a not-for-profit library service company, which obtains texts from a wide range of libraries and creates fiche in a common facility. The publishers limit libraries' role to provider of little used materials. In view of their own resource limitations, libraries are satisfied to wait to create fiche versions of their titles until a request is received. This way The Classics Reading Company's payments for conversion and use of the texts are a source of revenue, and the libraries avoided massive one-time conversion of old texts in anticipation of demand.

Materials

Materials include texts of books on disc or microfiche. The company offers the combination of current, retrospective, and out-of-print titles, because its principals believe the return on older titles justifies establishing the arrangements to acquire them.

Users

Users are anyone within reach of the facility's transmissions who is equipped with a buffered decoder to receive the transmission and a television or other display unit.

Users call up the facility and key in their ID number. Each frame transmitted is tagged with that user's television's identifier and page number. No signal from the user to the facility is required. Users' profiles include a normal reading rate for them and when calling up to request a title they specify the rate as normal or otherwise. The decoder buffer permits users to control the paging rate around the specified rate. Users buy a decoder and are charged per title read.

PUBLIC REFERENCE SERVICE--Reference Questions USA

Characterization

Reference Questions USA is a publicly-supported entity providing answers nationwide by mail or telephone. It provides the reference functions offered today in public and academic libraries at the desk staffed by professionals and screened from directional questions by an information desk. It provides only limited services to users such as today's humanities researchers, who need direct or indirect browsing access to extensive files of text.

History

By the late 1980s, public librarians determined that they could not preserve public library services unless the number of functions performed from headquarters and main branches could be reduced. Otherwise, it was impossible to watch citzens' information needs evolve and provide services that met those real needs. Jokes were made that public librarians would end up doing nothing more than ministering to sophisticated output devices--standing over a glorified printer in fear of being replaced if a post office or a drug store acquired similar equipment.

Public libraries eventually took radical action by instituting a centralized reference service. It was meant to enable libraries wishing to concentrate on serving unique regional and local needs to offload classic and increasingly electronic-based reference services. Users would initially be referred to the central facility by their local libraries. Eventually users would become familiar enough with the service that they would access it directly themselves.

Physical Plant and Location

Reference Questions USA serves all 50 states from a site in Kansas. (The site was chosen because the facility was built before telecommunications charges to subscribers were made distance-independent.) The facility's staff is 150 trained librarians; the facility is staffed and equipped to provide multilingual services. Its services are accessible via an 800 telephone number. Public entities subscribe to receive services on the part of citizens. Replies are provided by telephone or mail at no charge as part of the service. Or an audio tape cassette will be made at an extra charge paid by the end user.

Jurisdiction

Reference Questions USA is a public corporation supported by subscriptions. State and local governments subscribe in order to provide their citizens with the services their public library reference departments provided through most of the 20th century. Federal agencies subscribe in order to offer citizens certain public information services which the agency would otherwise provide either from Washington or their district offices.

The corporation has worked out service and price schedules over the decade of its existence. Subscription charges are based on population size--small towns and large cities pay approximately the same amount for the same level of service, although the subscription's formula

base does take into account assessed valuation and levels of millage voted for school financing. Subscribing governmental units opt for different levels of service. These range from telephone reference with a prescribed time limit through electronic searches and preparation of bibliographies. Subscribers have worked out a variety of ways of allocating the fixed amount of service at each of these levels to individual users. More than one-third of the corporation's subscribers make a point of allocating the full level of services to inhabitants of low income neighborhoods.

Materials

Reference Questions USA utilizes physical and electronic bibliographic and full text sources. Its collection and agreements with online bibliographic full text and numeric data sources give it resources similar to central and subject reference, document, pamphlet, and technical report collections, as well as some maps, of a large public library. The center owns and administers this physical collection for itself. It loans no materials and performs no custodial or bibliographic functions for any users besides its own staff.

Users

Over the ten years of its existence, Reference Questions USA has developed specialized services for clientele including state government employees, small businessmen, and grade school students in remote areas. In general, however, it serves public libraries' traditional users: grade and high school students, housewives, business people and professional workers, the elderly, certain groups of unemployed and minority populations, and certain recent immigrant and foreign language speaking populations. More of the users of the corporation's services are well-educated and have reasonable incomes than are poor and undereducated.

COMMUNITY CULTURE CENTER--Metropolis Public Library

Characterization

The Metropolis Public Library resembles today's public libraries in their locally-oriented services. The phrase community culture center denotes the fact that it evolves between 1982 and the year 2000 by linking itself to social trends and political issues important to the Metropolis local population and government.

History

In 1982, the library profession began sharing with trustees and friends groups its concern over libraries' future in light of technological change and declining library budgets. The profession argued that libraries faced a "Catch-22" situation.

- Humanistic and societal values dovetailed in the public library's role. It provided individuals and groups with the opportunity to encounter the knowledge and values of other individuals, groups, and social institutions. It also offered a meeting ground across social classes and national origins as well as across time and space.

- At the same time, a much greater amount of shrinking library budgets had gone to keeping up technologically. Yet most public libraries were failing to keep up. For example, either technological change obsoleted nonprint media the library bought, and its investment was wasted, or prices fell, and people could afford to buy media the library had believed individual consumers would not own at home.

The solution to this dilemma, it was argued, was to stop allowing the thrusts to use technology to support public services and the old public service traditions, to interfere with each other.

For example, funds had been expended to develop cable television production facilities in various communities. In those where it appeared successful, the facilities were built in close collaboration with citizen groups involved in local decisions to award cable channels for public information. Innovative technology use--such as development of community information data bases--would catch the public interest as well as the support of budget authorities with very careful homework about their actual relationship to community needs. Lacking this homework, libraries would be unable to continue to invest to update the technology as needs shifted.

Public library administrators sorted out these trends in the 1980s. The association between specific library programs (personnel or equipment based) and community needs became a key management tool for budget justification for facilities planning and for hiring.

Physical Plan

The Metropolis Public Library resembles today's urban library--in Queens or in St. Paul. It is not necessarily super-modern. Its programs and its buildings evidence its many linkages to the local

population's needs. It is located in the downtown site built in the 1970s. There was a few-year period in which it appeared that commerce and citizen life would migrate from this city center. Briefly it seemed that the Metropolis Public Library would need to relocate in one of the suburban neighborhoods. Then redevelopment of the City Center indicated that the downtown setting would allow for easy physical access for many citizens, and services continued to be offered from the original headquarters building. The same decision criteria were used for branches. Some branches already had been closed and remodeled for other uses by the mid 1980s. The decision as to whether or not remaining branches would be renovated for other users was held in abeyance for a period of up to eight years, while neighborhoods changed due to population shifts toward the center city and beyond present heavily populated suburban areas. Those branches and sites continuing to have sizable residential or commercial populations were closed or reopened on the basis of the character of local needs and support.

The central location of the Metropolis Public Library is equipped:

- to create video discs containing material of local interest and occasionally to create collections of material of short-term interest to local groups;
- to store and distribute productions of local public interest cable channels;
- to create local output and distribute government "documents" and to distribute program information from federal agencies on an on-demand basis;
- to serve as an output center to produce fine quality hard copy of materials published electronically--for example, illustrations to accompany the text of electronically published scientific articles;
- to create machine readable copies of master document copies for loan or nominal sale in tape form for home use--in a limited number of standard formats and when legal requirements for duplication are met.

Jurisdiction

The Metropolis Public Library reports through a local library board to the City Council. The Library Board membership gradually was expanded during the 18 years between 1982 and the year 2000 to include representatives of various constituencies with stakes in the library's services as a culture center. After a long period of negotiation and dispute over how to preserve the library's objectivity and diverse citizen participation, it was determined that constituencies

represented should include not only, for example, public radio, but also a limited number of special interest groups. The mechanism finally used for their participation was committees representing several interest groups concerned with a topic and working in a support and advisory role directly with the library's subject and program areas.

Materials

The Metropolis Public Library collection has contained a variety of kinds of material over the past 18 years as other sources of information have changed in cost and availability to citizen users. Categories of information still playing an important role in the collection by the year 2000 include:

- Community-specific materials and services as deemed important by groups which supported the need for continued library services during the last two decades. For example, in the mid 1980s the library collaborated with citizen groups concerned with education of Spanish-speaking citizens to develop adult basic education collections in Spanish and English. The need for this material has continued and with continued participation from the community this collection has been maintained since that time.

- Information still published in print form--including children's books, mass magazines, trade magazines, fiction, and some nonfiction.

- Computer and print files of local information including local history, adult education course offerings, local theater, government offices, clubs and organizations, referral information for human welfare agencies.

Users

As today, users include individuals and groups--groups constituted by the library and groups constituted by outside organizations. Other users include children; grade, high school, college, and adult education students; other adults; some business users (for example, for old local documents); and the elderly.

COLLEGE/UNIVERSITY INFORMATION SERVICE--Redbrick University Library

Characterization

The Redbrick University Library is the terminal-filled information production and dissemination center of its campus. It is the undergraduate library portion of 1982's academic library. Manuscript and archival collections and extensive retrospective print collections are administered for the University by the Humanities Research Institute.

History

The Redbrick University was concerned with escalating library costs and storage problems in its 20 separate library collections by 1980. Over a four-year period it undertook to centralize the libraries in one office reporting to the Dean for Academic Affairs. The Dean's office was willing to spend this time restructuring the library. Working with a small group of former departmental librarians she had understood that there were great potential rewards for using a reorganized library facility as the core of the next 20 years' information services facility:

- Student populations in business and professions, on the one hand, and humanities and the social sciences on the other, were approximately equal at Redbrick University. Books would continue to be important in supporting the curriculum. Yet, by 1990 most new faculty and any outside funding sources would be interested in development of instructional material utilizing electronic media. The facilities involved in supporting development and use of this higher education courseware would include centralized and distributive components. Fearing the battle of regaining control over expensive equipment once precedents existed for its separate control by academic departments, the Dean wanted the Library/Information Services facility to be a neutral base for controlling the entire configuration.

- The former departmental librarians working with the Dean had been involved, at Redbrick University and in previous jobs, in planning joint facilities for higher education with state public telecommunications networks, in managing a joint library/instructional media center, and in regional network relations at a research-oriented graduate medical school. In light of these experiences, the group was concerned that custodianship of large collections of printed material would undergo tremendous changes during the period in which the Library/Information Services facility was meant to develop.

-- Many custodial functions would become obsolete as various alternatives to hardcopy storage were developed.

-- Circulation functions would become archaic for some academic departments, since most material used in the professional schools and several of the scientific disciplines would be published and used electronically for the most part, late in this planning period.

-- Key issues related to bibliographic control would change during the planning period. Institution-specific approaches to bibliographic access using information other than or in addition to citations, would become more important. (The library began participating in all commercial and not-for-profit publishers' experiments providing book and journal access via index approaches in 1983.)

-- Finally, reference services, these librarians believed, needed to emphasize direct user querying of data bases whenever possible. As new information referral techniques developed, intermediaries would continue to be necessary. Yet, Redbrick graduates would have to use internal and external data bases and application software nearly anywhere they worked after graduation.

Physical Plant and Location

Redbrick University's Library/Information Services offers facilities (administered but not housed together) for computer-aided instruction; computer conferencing; internal cable; sharing of text within private academic networks and use of local, regional, and national information sharing networks; distribution of information over internal systems from centrally located media; and assistance in the creation of learning materials using video disc.

The major complex housing this equipment is located at the main campus. A variety of output devices as well as local terminals for all faculty, students, and staff are distributed throughout the main and associated Redbrick system campuses.

Jurisdiction

Oversight of the Library/Information Services was elevated to the Provost level in 1990 due to the major control and coordination issues raised by large capital investment in the central facility for on-site development of courseware.

- Faculty and students are heavily involved in planning and budgeting for equipment utilization and courseware development.

- Local campuses make semi-independent use of institutional facilities (the outcome of years of pressure to decentralize the centralized resource) through reliance on networking capabilities of Redbrick's computing facilities.

- Both former library administration and former computer center administration are involved in managing these facilities.

Materials

Redbrick's information resources come in all formats--print, microform, mass market magazines and trade journals, magnetic and video tapes, and video disc.

Electronic data bases are the medium absorbing most materials budget. The Library/Information Center also contains an extensive collection of commercial and internally developed applications software.

Users

Users are faculty, staff, and students. The student population includes on-campus residents, residents from other system campuses, students matriculating entirely from remote locations, and citizens of nearby cities whose adult education activities entitle them to use Redbrick's facilities.

RESEARCH SERVICES--The Humanities Research Institute

Characterization

The Humanities Research Institute is a loose confederation of research libraries. In many ways its member operations resemble those of present research libraries. Its members include, for example, the Widener Library at Harvard, the Center for Research Libraries, the Newberry Library, and the Research Collections of the New York Public Library. Therefore, like today's research libraries Institute members serve on-site and remote, personal and institutional users. Unlike today's research libraries, however, the members of the institute wear only one hat--they serve only research users. (There could be a similar institute for libraries in the fields of medicine or science and technology. This scenario does not discuss such an institution. By the year 2000 it and its members would have a different identity from what is visualized here.)

History

The confederation of members of the Humanities Research Institute formed the Institute between 1985 and 1990. Two factors led to its establishment:

- A trend for academic libraries to treat resources for instruction and for research separately.
  - -- Some academic libraries were pressured by their administrations to find other housing for little used materials;
  - -- Other academic libraries chose to keep print collections as small as possible and develop reference and acquisitions functions which emphasized commercial, not-for-profit, and private user group-generated data bases and application software;
- Concern about preserving traditions of humanities research;
  - -- The popular press expressed this concern as fear that widely used technology was leading to synthesis of literature from data bases in 15 days. Authors would forget lifetimes had been spent in preparation of thoughtful treatises. Readers would no longer be able to see the works of the last 100 years ranged side-by-side for study and examination. Scholars and a small number of not-for-profit organizations shared the concern, although they were particularly concerned that the humanities had suffered for at least the last four decades. The humanities appealed less to private sector information entrepreneurs and garnered fewer public research dollars as computer technology was applied to information as early as 1960.
  - -- Trade unions and divisions of several federal agencies concerned with domestic industry and employment were concerned with the existence of intellectual resources to occupy increasing hours of leisure in a work population facing work weeks ranging from 35 to 20 hours.

The Institute was actually formed after many of its members had begun to deal individually with these problems or concerns. Yet official recognition of research library resources as a specific type of information resource helped. Between 1985 and 1990, a variety of physical or administrative or strictly on paper arrangements were made. Research libraries became responsible to their parent organization only for providing and maintaining services to the parent institution's designated "research" collections and to those collections' users. Members of the Humanities Research Institute were no longer direct supporters of academic instruction, for example, or of citizens' daily information needs.

Physical Plant and Location

Institutional members of the Humanities Research Institute for the most part still occupy their 1980s locations. Their facilities tend to house collections including full size print originals of most sources. Tape or fiche copies are retained of all documents duplicated for local or remote users, although no overall effort is made to convert print materials for electronic storage. Federal support has underwritten equipment for transmission of documents among institute members. Private donations have been used to acquire laser printers and video disc recorders for a handful of members with extensive manuscript collections and large endowments.

Jurisdiction

The Humanities Research Institute is itself a policy board without a physical institution. When it was first constituted the decision was made to minimize administrative overhead to the extent possible by delegating most administrative services to Institute members.

Most Institute members' own governing bodies are composed of representatives (1) of their original parent institution and (2) a few additional members representing outside constituencies--users. Virtually all the members determined in the 1980s that payments by users outside their original jurisdiction would be necessary for the continued survival of the research facility.

Materials

There is wide variation among institute members' collections as well as among services available to users of the collections. Federal funds are available to provide small public service staffs to members opening substantial portions of their collections to citizens with serious interest in those collections. Institute members have the

option, however, of relying on federal assistance only for designated technical support--for example, in the area of preservation, and in turn, need offer no browsing facilities (although members of the public cannot be turned away). Services provided by institute members therefore may include:

- Texts of works themselves (fiche or original or both), and entire subject collections to afford readers browsing facilities;

- Special fee-based services supported by requisite staff capability, to provide on-demand analysis and duplication, utilizing capital equipment for copying and text analysis; and

- Bibliographic access supplemented by some sophisticated electronic aids. (Institute policy has been to encourage members to offer on-demand analysis services rather than to prospectively provide access at fine levels of detail to collections which are, for the most part, not in machine readable form.)

Users

Depending on the federal support each institute member has opted to receive, users are scholars or scholars and citizens.

APPENDIX 1

TECHNOLOGY AND MARKET DEVELOPMENTS AFFECTING LIBRARY FUNCTIONS IN 2000 A.D.

This appendix is organized around the matrix that appears in Figure 1. The rows of the matrix indicate standard library functions; the columns indicate the technologies and market developments of greatest interest in this discussion. The cells of the matrix contain reference numbers (e.g., "(15)") keyed to the paragraphs of the following text. Thus ("15") indicates that there is a brief statement in the text about the way video disc technologies bear on the library function called REFER.

The material in this appendix was drawn from various sources in Arthur D. Little, Inc. Naturally, responsiblities for interpreting the technology forecast in library terms rests with the author.

Present Library Functions--Selection of Materials

Extensive data bases will be accessible to the public over home terminal services such as Videotex. These will include catalog-type data bases offering a variety of kinds of access (simple tree-type access or more complex hierarchical access such as is available in today's bibliographic data bases). These services may utilize data bases prepared and still owned by libraries. It is equally likely, however, that these data bases either will be a one-time purchase from libraries supplemented by something like Books in Print online, for example, "Local Public Library Books through 1985", or that the entire data base will be created by publishers. (1)

It will be possible for demand publishing services to be offered by any information industry participant having output media and/or ownership rights on texts. These services can be provided in (locally printed) hard copy form to meet an individual corporate user's subject requests, and can be offered for video display in the home. (2)

Both of the above will narrow the range of subject material within which libraries will make materials selections.

FIGURE 1

INFORMATION TECHNOLOGIES AND MARKET DEVELOPMENTS LIKELY TO PROVIDE SUBSTITUTES FOR LIBRARIES' PERFORMANCE OF SELECTED FUNCTIONS, 2000 AD

Numbers are references to portions of Appendix text.

LIBRARY FUNCTIONS	HOME COMPUTERS	VIDEO DISC	VIDEOTEX	INTEGRATED OFFICE SYSTEMS	INFORMATION INDUSTRY--CONDUIT SECTOR[1]	INFORMATION INDUSTRY--CONTENT SECTOR[2]
SELECT			(1)			(2)
STORE	(3)	(4)				(5)
SHARE	(6)		(6)	(6)		
CIRCULATE					(7)	(8)
MANAGE	(9)	(10)		(11)	(12)	(13)
REFER	(14)	(15)	(16)	(17)	(18)	(19)
LOCATE			(20)		(21)	(22)
EXPLAIN	(23)	(24)		(25)		(26)

[1]Column refers to the companies providing telecommunications or delivery services, although many of these companies are vertically integrating to provide, for example, data bases as well.

[2]Column refers to publishers, broadcasting, or entertainment companies--now in many cases vertically integrating to provide delivery services as well as text and data.

Present Library Functions--Document Storage

A major change in the future will arise from the exploitation, in homes and offices, of the storage possibilities inherent in video discs and video tapes. Combined with the manipulation capabilities offered by home or business computers, these media will permit low-cost storage of large amounts of information on site. In general, video discs are likely to be preferred when large numbers of copies of information are produced and when the information contents change only slowly, while tapes will be preferred for small scale production and for information that requires frequent updating. For many purposes, therefore, information providers and publishers will make video tapes and/or discs their primary distribution medium. (3)

In addition, copies of discs or tape masters could be stored at numerous locations from which selected contents could be transmitted electronically to users in much the same fashion that data bases are, for situations where users have not purchased the disc or tape because of anticipated low usage. (4)

Finally, the information industry, as noted above, is likely to participate heavily in on-demand publishing. The ability to obtain a text on demand obviates the need for document storage at all. (5)

Present Library Services--Common Facility in Which Users Share Access to the Same Information

All of the technologies under consideration offer wide numbers of users access to common information facilities and data bases. Similarly, home computers and integrated office systems will allow users to create virtual private networks through which they can share a common view of subsets of data available in common data bases.

Nonetheless, none of them provides users with an identical view of the information facility to the same extent that the outside building facade, layout, and card catalog of the library present a single aspect to all users. The new technologies tend to permit far more individual views of information resource to be developed. (6)

Present Library Functions--Circulation

Information will be generated in a form ready for electronic circulation by all of the same originators of text and data as today--scientists, office workers, authors, publishers, government agencies, and a variety of transaction-oriented processors of records that are refined to create statistical information. (7) (8)

Strong competition over ownership and operation of systems combining content and facilities to communicate information is likely to have gone through several stages by the year 2000.

- In the early 1980s publishers, computer services, value-added networks, common carriers, equipment manufacturers, and others--using joint ventures, acquistions, and internal development--all will compete for strong positions to distribute content information.

- By the mid to late 1990s, communications networks will be in place with software for formatting the material, addressing users, and switching requests in such a way that graphic and text output can be received from several sending locations.

Present Library Function--Management of Information

Home computers will offer the user in the home and the small business capabilities to create and manage personal files. The user will have his own storage and will be able, within the limits of mass-oriented applications software, to tailor his access tools. (9)

Integrated office information systems and video tape (and perhaps disc) systems will offer similar capabilities in the work environment. They will provide extensive capabilities for individual users to structure and use personal files oriented towards their individual problem-solving styles and vocabularies. (10) (11)

The information industry also will provide tools for personal and group--organization-wide--information management. Service providers ranging from publishers through telecommunications companies will offer not merely delivery service or information content but in addition, software for manipulating data and/or formatting output, all of which will assist users to structure problems, answers, and how results are retained for future use. Providers from the telecommunications (conduit) end of the business through the publishing (content) end of the business all will develop services which integrate supplying of data with a variety of algorithms and formatting output software to provide tools for personal--and organizational--information management. (12) (13)

Present Library Functions--Reference

Home computers, their associated applications software and private user networks--already possible over such services as The Source--will offer individuals answers to practical questions from their own data base or from those of their relatives or friends. (14)

For common kinds of information needs--travel, information needed by the homemaker, home repair, and directory or encyclopedia reference--video disc technology may be used to create home reference series or services. Videotex data bases directed to this subject also are likely to be developed. This is especially the case where practical information needs will be facilitated by interaction; that is, where users will be interested in knowing possible consequences of a user's applying the answer to the question he has asked. (15) (16)

Integrated office information systems will enable their users to access and use external data bases in combination with internal management information systems. (17)

The information management oriented products and services offered by commercial organizations specializing in telecommunications or information provision also are likely to offer users direct or indirect access to information data bases which can be used interactively to answer a wide range of reference-type questions. (18) (19)

Present Library Functions--Locate Information Identified to Fill an Information Need

The equivalent of a (vastly higher quality) television screen displaying Videotex-type information will, in the year 2000, represent a delivery device by which a great deal of information related to purchasing decisions is made available to the individual at home. It is likely, therefore, that whatever other facilities originators of information use to distribute information to work or learning locations, originators or their representatives will use home information services to enable individuals to initiate transactions to acquire hard copies of a great many kinds of desired information. In the same way that companies ranging widely in size and revenues all advertise in the Yellow Pages, information providers--including those with very low profit margins--are likely to utilize such services for delivering information, themselves, even if they do not make publications lists, abstracts, or indices available over this medium. For example, it might be possible to order a copy of a scientific journal article over this medium after determining its existence from a commercial information provider. (20-22)

Present Library Functions--Explain/Interpret Information

By the year 2000 information retrieval and other kinds of software will exist to enable users of home or office information systems to better utilize information which exists in texts or data to which they

have access. Users will be able to interpret information, relying on (1) meaning which is structured into whatever information the data base contains--subject codes for indexed material, subheadings and indices associated with text material, and (2) raw information which can be "mined" using a variety of analytical language oriented tools for searching and problem solving. (23)

The contents of video discs can be selected and arranged ahead of time to interpret a subject known to be of interest to possible users. Or the material can be indexed and programmed so as to enable a user to interpret new material for himself. (24)

Services from information industry providers of content information also will provide the user software to enable him to be his own intermediary more of the time. Greatly increased user friendliness of software and user-transparent means for moving among data bases and among system functions (communication, information search, and file manipulation) will enable a user more readily to draw on and integrate from what he knows--using his unique problem-solving style. (25)

One of the most difficult things to imagine about the year 2000 is the number and nature of modes that will be available in the multifunction networks for sharing information and transacting business. In spite of apparent complexity there is bound to be a considerable degree of familiarity--for example, the same that now exists with the kinds of products and services presented in the Yellow Pages today. That is, enough is laid out in the Yellow Pages about thousands of businesses whose specialities we do not understand so that we feel we can use the directory efficiently to find products or services which we seek. We anticipate that this interpretation/reference function will largely be in place in the year 2000, give or take five years. We believe libraries will not have a central role in performing it because, like the Yellow Pages, use of the information will be closely enough related to spending decisions that the function is likely to remain in the private sector. (26)

CONCLUSION

The scenarios that have been presented (and the more detailed technology impacts noted in Appendix 1) provide ample evidence for the kind of change that will affect the library scene between now and 1999. No one will be surprised to learn that information services will be driven by economic factors. Cheaper ways of delivering information will flourish, the marketplace will support new enterprises, and the character of information services will be defined by the interests that have economic muscle. A period of rapid and turbulent change, not necessarily for the better, is in prospect. Against this background it is unusually difficult to define the library's goals, its posture, and its evolution plan.

Yet the scenarios indicate that there is a public interest--a profound one--in keeping the channels of information accessible to all, fair and unbiased, and as free in all senses as possible.

And the scenarios indicate that the library cannot work alone to achieve this objective. The libraries in the scenarios of the year 2000 established--or re-established--their mandate by working to strengthen their relationship with the organizations from which they originally derived this mandate. They succeeded in retaining a role by building upon one or more of the following bases:

- There is not a disciplinary orientation in the acquisition and presentation of information in the library. This is important in a world in which other information services are concentrating on a discipline or industry specialization.

  On Red Brick University campus the library is neutral territory on which to develop university-wide information resources.

- Most private sector information providers will offer a wide variety of types of information--data, software, article texts, for example--but the selection of material they offer will be made on the basis of the profit potential of the package as a whole. On the other hand, the set of information sources the library can make accessible is not and is not meant to be profitable; that is, it does not make economic sense as a single complex of services. Yet within the resources available, this set should represent a broader, more diverse, and sponsor-free selection of information sources.

Reference Questions USA is not a commercial organization. Within the resources available, it is not selling anything, carrying anyone else's advertising, nor (with the exception of some proprietary services it cannnot obtain) is it leaving out any information because another information provider offers it.

- Libraries reflect to their public what is and has been important in their community. The library is therefore helping establish and strengthen individuals' and groups' sense of identity--at a time when most cultural forces make it harder rather than easier to know what it means to grow up and work in one particular family, region, and social group.

  Metropolis Public Library's services--its selection of the technology used in public services and its collecting and program priorities--are a mirror to the community of the values the community places on its common experience and interests. Absent this reflection, the political process will deny Metropolis Public Library its financial support.

- At a time when the retired population will be larger and the working population will have more leisure time, there is great need for access to printed texts which date from before the time when intellectual and aesthetic works were created in electronic form.

  Humanities Research Institute maintains society's access to material which will be least changed by electronic methods of distribution, and which there is least profit motive to preserve.

- In the late nineteenth century when the citizens most in need of upward social mobility could not afford to buy more than a few books, libraries bought books for those citizens. Strong arguments can be made that there is a parallel need in the late twentieth century, and that for at least ten years, today's equivalent is personal electronic information-related luxury goods.

  At least in the 1980s, there will be far more personal computers in suburban schools and middle class homes than in city schools and poorer homes. By providing access to such information technology, Metropolis Public Library is making available an information resource that part of the public cannot afford to provide for itself.

- Librarians are among the information providers most oriented to the content-related aspect of information service. Librarians traditionally array information within and among subject categories so as to suggest its content and match information sources to skills and interests of individual questioners.

  Each experienced future user of electronic data bases can have his own personal view of the data base. But even experienced users are likely to need help with unfamiliar topics. Needed will be year 2000 equivalents to the transparent structure of information libraries have provided in their shelf arrangement, the Dewey or LC Classifications schemes.

  Red Brick University and Metropolis Public Library concern themselves with the processes of obtaining and disseminating information. But at the same time these libraries are concerned with the transfer and interpretation of information. Using their library is one of the users' main opportunities to get a sense of the whole common information universe, which underlies each user's personal view of the sources he uses daily.

- Mixed electronic and print information sources badly need expert assistance to make the sources comprehensible as a whole, but especially to make the sources accessible in their parts. That is, to meet many information needs, costly integrated information resources will need breaking down--disintermediating--into less complex pieces.

  Red Brick University, Reference Questions USA, and Metropolis Public Library understand the range of resources to be offered to obtain adequate coverage in their collections. They also then allow a user to request a narrow and specialized slice of the whole and assist in identification of material wanted to cover that slice.

Libraries' title to the multiple functions involved in meeting information needs is no longer undisputed. This is not because they have failed to keep up. Rather a great deal more specialization of function has been made possible by the capabilities to collect, process and distribute information provided by new technologies.

Yet there is a continuing need for libraries as institutions which are dedicated to information provision that combines:

- the aim to meet individuals' information needs in a way that furthers a public, organizational or societal good with
- an institutional stance which allows for--within those public good constraints--objectivity and freedom from the need to make a profit.

In the scenarios we have assumed that library administrators have interpreted their role to their parent organizations well enough to obtain support for providing access to information at rates not necessarily directly related to costs. We have assumed that library use is not 100 percent externally supported--fees are charged for some services. We have assumed that libraries are not required to make a profit.

Therefore, while libraries aren't likely to have the same formal and informal entitlement they have had in the past to the information provision role, they have the opportunity to possess an institutional role from which they can continue to perform relatively unique and vital services. That is, the year 2000 library has a platform for service, and faces the challenge of translating this platform into year 2000 idioms.